



Staff of the National Clearinghouse for Worker Safety and Health Training surround a sculpture of labor leader George Meany (left to right): Katherine Roberts, Jeffrey MacDonald, Betsy Lewis, Joyce Reimherr.

NIH has recently launched a new initiative to investigate bionutrition. Weinberger has a strong interest in studying the mechanistic action of nutritional agents such as vitamins. Successful correlations of RAR and RXR with the vitamin A metabolites all-*trans*-retinoic acid and 9-*cis*-retinoic acid have redirected thinking about molecules such as vitamin E, whose functions have been attributed solely to its antioxidant properties. The antioxidant properties of vitamin E or α -tocopherol are especially interesting considering that this molecule is a terpene structurally similar to vitamin A.

One of the classical features of vitamin E deficiency is the inability of rodents to maintain pregnancies. Vitamin E-deficient rodents typically spontaneously resorb 15-day-old fetuses due to suppressed development of mesodermal tissues including the blood islands of the yolk sac and embryonic liver. Other cardinal deficiency signs include inductions of catabolic lysosomal enzymes that produce a muscle wasting from cellular protein and nucleic acid breakdown. These physiological changes may result from the vitamin's actions as a receptor co-activator, perhaps operating like RXR only in the presence of other *trans*-acting factors to promote gene transcription. The presence of vitamin E-binding polypeptides in liver cytoplasm has been established, although the biochemical evidence was relatively weak. These polypeptides may be more akin to the cellular retinol-binding proteins, which are thought to function more in a transport role for vitamin A. If vitamin E operates via an identified or unrecognized orphan receptor species, it most likely will require cell culture system for analysis. Such observations,

considered with the multiple roles of vitamin A metabolites, may outline future studies of the role of vitamin E and other nutritional factors and environmental chemicals as receptor-transducing signals.

National Worker Training Clearinghouse

The NIEHS Superfund Worker Training Program has awarded a new two-year contract to the George Meany Center for Labor Studies in Silver Spring, Maryland, to operate the National Clearinghouse for Worker Safety and Health Training for Hazardous Materials, Waste Operations and Emergency Response. The clearinghouse will support the nationwide NIEHS training program, facilitating the transmission of technical information and curricula developed for safety and health training programs for hazardous waste and emergency personnel.

NIEHS was given major responsibility for initiating a training grants program under the Superfund Amendments and Reauthorization Act of 1986 (SARA). The major objective of this program is to fund nonprofit organizations in developing and delivering training to workers who handle hazardous wastes or who respond to accidental releases of hazardous materials.

Although NIEHS has developed a solid national training program for workers in high-risk occupations, the safety and health problems at toxic waste cleanup sites have substantially increased in extent and severity. After initial delays in beginning remediation at waste sites, the EPA Superfund program has been supplemented with even larger environmental restoration programs by the Departments of Energy and Defense.

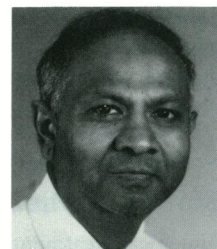
In addition to creating a resource library that holds all the curricula created by the NIEHS training program, the clearinghouse at the George Meany Center publishes a monthly news brief and activity report including information about hazardous materials, hazardous wastes and emergency response, and regulatory progress. The clearinghouse also arranges and manages technical workshops related to scientific, administrative, and regulatory issues associated with training for hazardous waste workers and emergency responders.

The George Meany Center for Labor Studies is a residential adult-learning center that provides leadership and technical education for the members, staff, and officers of national and international unions affiliated with the AFL-CIO. The Meany Center is also home to the Railway Workers Hazardous Materials Training Program, which is one of the eighteen cooperative agreement awardees that is supported through the NIEHS Worker Training Program. Further information on the clearinghouse or the NIEHS Worker Training Program can be obtained by calling (301) 431-5425.

Carcinogenesis and Diet Restriction

Rodents are the most commonly used animal models for chronic toxicity and carcinogenicity studies. The National Toxicology Program has typically used two-year studies with both sexes of rats and mice to evaluate the carcinogenic potential of chemicals.

In recent years, the survival of many strains of rats at the end of two-year studies has been less than 40%. This decreased survival is a serious concern to researchers involved in evaluating the safety and carcinogenic potential of drugs, food additives, pesticides, and other chemicals.



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Diet is one of the most important environmental factors that influence survival. Diet restriction of greater than 30% for rats not subjected to chemical treatment lowers body weight, lowers the incidences of body weight-associated tumors, and increases survival at the end of two-year studies. Diet restriction markedly decreases incidences of tumors induced by chemicals and makes the animal irritable and aggressive. Furthermore, chemicals influence energy utilization, and diet restriction may disproportionately influ-

ence the physiological processes of animals in chemical treatment groups, thus complicating the interpretation of studies. The NTP/NIEHS is conducting studies with diet modification and diet restriction in combination with chemical treatment. The objectives of these studies are to assess 1) the influence of body weight on the carcinogenic response by comparing an *ad libitum* fed control group and a diet restriction control group with a high-dose treatment group, 2) the influence of moderate (~20%) diet restriction in control and treatment groups on the sensitivity of chemical response, and 3) the influence of diet modification on body weight, chronic diseases, tumor rates, and life span.

The problems associated with increasing body weights and decreasing survival of rats must be resolved in order for long-term carcinogenicity studies to be reliable. Rodent diets did not change substantially during the last 15 years. Researchers want large rodents at low cost, which may be the main reason for selecting breeding colony animals that reproduce early and grow faster thus increasing the body weight of breeding colony animals year after year. If not controlled at the breeding colony, the current selection process of breeders would still lead to higher body weights with higher tumor rates and a shorter life span. Diet restriction to lower body weight may be a treatment of the symptom rather than the cause. Recommendations for permanently resolving the problem include 1) selecting slower-growing breeders in the production colonies to lower the body weight of the progeny, 2) modifying diets so they are adequate for growth and maintenance but do not contain excesses of growth-enhancing nutrients, and 3) modifying the feeding behavior of rodents by husbandry procedures such as group caging and making food available only during the normal feeding period (night).

Biodegradation As a Remedy

Biological treatment of hazardous wastes may be an effective, practical, and economical way to remediate Superfund sites and other hazardous wastes. Scientists from across the United States and from several other nations discussed the principles of microbial detoxification and transformation of environmental contaminants at the conference "Biodegradation: Its Role in Reducing Toxicity and Exposure to Environmental Contaminants," held April 26–28 and hosted by the NIEHS Superfund Basic Research Program. The purpose of the conference was to examine the current state of knowledge, the research needs in biodegradation and treatment, and the role of these processes in reducing



Steering Committee for the biodegradation conference (back row, left to right): William Suk, James Hunt, Steven Aust, James Tiedje, Robert Arnold, (front row) Martin Alexander, Lily Young, Daniel Abramowicz, Jodi Shann.

the toxicity of and exposure to environmental contaminants. More than 300 registrants participated in the three-day meeting, which included presentations by invited speakers and about 60 posters by representatives from industry, academia, and government. The meeting was divided into three broad topic areas: toxicity reduction, exposure reduction, and microbial ecology. Each area was discussed from a multidisciplinary perspective under the broader context of basic research in biodegradation.

The session on toxicity reduction included presentations on the genetics of novel biodegradation pathways, the biochemistry and genetics of polychlorinated biphenyl (PCB) metabolism, and degradation by fungal peroxidases. In the session on exposure reduction, presenters discussed mechanisms of treatment by white rot fungus, soil treatment laboratory and field studies, and PCB cleanup. The session on microbial ecology focused on selecting chemical-specific degrading bacteria, enhancing degradation capabilities through molecular biological techniques, and tracking microbial populations in the effective reduction of exposure.

In opening remarks, the Chair of the Steering Committee, Lily Young of New York University and Rutgers University, stated that disease prevention and reduction of risk and exposure are fundamentally affected by the degradation and transformations of toxic chemicals mediated by microbial communities both in natural environments and constructed treatment systems. William Suk, director, of the

NIEHS Superfund Basic Research Program, and a member of the steering committee, pointed out that cleanup of contaminated soils, sediments, and groundwaters not only improves the environment, but it is also a means by which human exposure and health risks can be reduced. The conference ended with closing remarks by Martin Alexander of Cornell University. Alexander addressed the questions yet unanswered about the biodegradation activity of microbes and their interactions with the physical/chemical environment.

New Worker Training Initiative

The U.S. Department of Energy and NIEHS have signed an interagency agreement to develop model worker safety and health training programs for workers involved in waste cleanup at facilities in the nuclear weapons complex. The Congress established the worker training program in the National Defense Authorization Act for fiscal years 1992 and 1993. This authorization appropriates \$10 million for worker training. Preference is to be given to current awardees of the NIEHS Worker Education and Training Program.

In the fiscal year 1991 National Defense Authorization Act, Congress requested that DOE "evaluate the suitability of the training program developed by the National Institute of Environmental Health Sciences (NIEHS) pursuant to Section 126 of SARA [Superfund Amendments and Reauthorization Act] for training workers involved in environmental restoration and